

EXHIBIT O

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S and 3 SHAPE INC.,
Petitioners,

v.

ALIGN TECHNOLOGY, INC.,
Patent Owner.

Case IPR2021-01241
Patent No. 10,791,936

**PATENT OWNER'S PRELIMINARY RESPONSE
PURSUANT TO 37 C.F.R. § 42.107**

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I. INTRODUCTION

The Board should not institute *inter partes* review of claims 1-20 (the “Challenged Claims”) of U.S. Patent No. 10,791,936 (the ’936 patent) because petitioners 3Shape A/S and 3Shape, Inc. (“3Shape” or “Petitioners”) have not met their burden of showing a reasonable likelihood of prevailing on any of the proposed grounds of unpatentability.

First, the Board should exercise its discretion under 35 U.S.C. §325(d) to deny institution on the basis that Petitioners rely on prior art references already expressly considered by the Examiner during *ex parte* prosecution. They falsely assert there is “no evidence” the primary references of Rubbert and Babayoff were considered by the Examiner. Pet., 78-79. This is demonstrably untrue as both references (as well as multiple similar references by the same Rubbert and Babayoff inventors) were submitted during prosecution and expressly considered by the Examiner. Yet the petition fails to even allege, let alone establish, Examiner error and offers only a conclusory statement there are no “Section 325(d) concerns.” *Id.*

Second, should the Board reach the merits, the petition presents two alternative theories of unpatentability that both fail. In Ground 1, the petition argues that there is no “temporal aspect” to individual steps recited in the challenged claims. Petitioners then leap to the conclusion that the claimed “second

scan data including surface data of a ***physically changed*** portion of the patient's intraoral cavity" is satisfied by a pre-treatment scan in Rubbert where the teeth have not had orthodontic brackets added and have undergone no physical change at all. This contradicts both the plain language of the claims and the intrinsic record. During *ex parte* prosecution, for example, the Examiner expressly acknowledged the claims require the formation of a composite image of part of an intraoral cavity by removing a selected part of a model from an initial scan and substituting new scan data from after a physical change to that part of the intraoral cavity. EX1004, 5. Petitioners disregard the language of the claims, ignore the intrinsic record including the Examiner's findings regarding the recognized subject matter of the claims, and provide no *Phillips*-based analysis supporting their strained attempt to read Rubbert's disclosure onto the challenged claims.

In Ground 2, Petitioners presume that there is a "temporal aspect" to the claims—which Rubbert fails to disclose—and assert a modification would have been obvious. *See* Pet., 42-43. Specifically, Petitioners propose updating Rubbert's edited post-treatment scan image with another post-treatment scan taken at a later point in time after cleaning a tooth or adjusting its bracket. The proposed modification makes little sense as neither scenario would provide the unbracketed surface data used to fill a void in Rubbert's edited scan. Nor do Petitioners explain why a person of ordinary skill in the art ("POSA") would discard the pre-treatment

scan already possessed (which Rubbert uses to void-fill its edits), embrace additional time and effort, and opt for a suboptimal, entirely new scan. At bottom, Petitioners propose an illogical modification transparently driven by impermissible hindsight that would still fail to achieve Rubbert's own objectives.

Because Petitioners neither support their arguments on their own merits nor justify their departure from the Office's conclusions during prosecution, Grounds 1 and 2 fail. Grounds 3 and 4 do not remedy these deficiencies, as they are directed solely to dependent claims and never address the defects in Petitioners' arguments regarding the independent claims.

Accordingly, institution of *inter partes* review should be denied.

II. INSTITUTION SHOULD BE DENIED UNDER §325(D)

At the outset, denial of institution is warranted in view of the petition's reliance on "substantially the same prior art or arguments" previously considered by the Office. 35 U.S.C. §325(d). The Board's §325(d) analysis applies a two-part framework guided by several non-exclusive *Becton, Dickinson* factors. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 6 at 9-10 (precedential); *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (precedential, §III.C.5 ¶1). First, the Board considers whether "the same or substantially the same" art or arguments were previously presented to the Office. *Advanced Bionics*, Paper 6 at 8. If so, the

Board considers whether the petition demonstrates that the Office “erred in a manner material to the patentability of challenged claims.” *Id.*

As explained below, the petition relies on the same art previously presented to the Office, and the petition does not demonstrate any error in the Office’s previous assessment.

A. The Petition Presents Substantially the Same Art and Arguments Previously Considered by the Office

Factors (a), (b), and (d) of *Becton, Dickinson* address whether “substantially the same art or arguments” previously were presented to the Office. *Advanced Bionics*, Paper 6 at 10. Factor (a) considers the relevant “similarities and material differences” of the applied art, while factor (b) considers whether the art is “cumulative.” *Becton, Dickinson*, Paper 8 at 17. Factor (d) considers the “overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art.” *Id.*, 17-18.

Factors (a) and (b) – The same art relied on in the petition was presented to the Office during the examination of the application that led to the ’936 patent. As Petitioners concede, both Rubbert and Babayoff were disclosed to the Examiner in IDSs. Pet., 78. Petitioners assert that “there is no evidence that the Examiner substantively considered these references” (Pet., 78-79); however, the Examiner indicated that he did consider each reference on March 29, 2020. *See* EX1004, 153

(stating “ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH,” and lining through no references). In fact, the two references appear next to each other, on adjacent lines of the same IDS page. *See id.* (showing Babayoff (W0-0008415-A1) and Rubbert (W0-03094102-A1) on lines 024 and 025 respectively). The Board has held that an IDS citation alone satisfies the first *Advanced Bionics* element. *Husky Injection Molding Sys., Ltd. v. Plasipak Packaging, Inc.*, IPR2020-00430, Paper 23 at 12-13. Petitioners speculate that the Examiner might not have considered either Babayoff or Rubbert substantively due to the “citation of hundreds of references” (Pet., 78-79), but this assertion is dubious. Babayoff, for example, was not merely cited in an IDS, but was also cited repeatedly throughout the specification. *See* EX1001, 3:55, 18:43, 19:53, 19:66. As for Rubbert, while it was not applied as a rejection, the Examiner did cite multiple references in the Notice of Allowance, including a publication in the same patent family by the same inventor. *See* EX1004, 4 (citing US 20020006217 to Rubbert). The Rubbert application relied on by Petitioners and the Rubbert application cited by the Examiner had overlapping inventors, assignees, and subject matter. *Compare* EX2001, *with* EX1005. In fact, the priority application of the Rubbert PCT relied on by Petitioners (US10/136,607), was a continuation-in-part of the Rubbert reference cited by the Examiner. *See* EX2002, Face. Thus, the Rubbert reference was presented to the Examiner, expressly considered, and

Petitioner presents no reason to conclude otherwise.

Factor (d) – Petitioners’ arguments also substantially overlap with arguments considered during examination. Specifically, two conclusions that the Examiner drew in the Notice of Allowance are applicable to Petitioners’ use of Rubbert in Grounds 1 and 2.

First, the Examiner clearly understood that the claims are directed to updating an initial scan (the first scan data) with new scan data (the second scan data) of the intraoral structure after the patient’s intraoral cavity itself has physically changed. EX1004, 5. In the Notice of Allowance, the Examiner summarized the mutual understanding of the claims as applied to the cited art, concluding that the art had “an important distinction from the instant applications’ claims, which provide a composite scan based on both a first (initial) and second (post-change) scan.” EX1004, 5. Thus, the Examiner understood that the language of the claims provides a temporal relationship between the first and second scans: specifically, it indicates that the “second scan” is a “post-change” scan while the “first scan” is an “initial” scan. The Examiner reinforced this interpretation by describing the claim requirements as “generating a composite scan by using a second scan to update the changed region from the first,” and stating that “data is newly captured and composited to update for the intra-oral modification.” *Id.* This is consistent with the claims’ description of the second

scan data as including a “physically changed portion of the patient’s intraoral cavity,” as the physical change to the patient’s intraoral cavity differentiates the second scan from the first scan. *See infra* §III.

Second, the Examiner concluded that the prior art undermined any motivation for updating a specified part of an initial scan with new post-change scan data . *Id.* In particular, the Examiner concluded that the closest of several references, “the Kriveshko WIPO reference (WO 2007084647 A2),” taught that when errors were detected and new data was obtained, one should “generat[e] an entirely new scan rather than generating a composite scan by using a second scan to update the changed region from the first.” *Id.* The Examiner noted that Kriveshko considered a process of iterative modification of a surface preparation, yet he concluded that Kriveshko nonetheless taught away from compositing new data into an earlier scan, and that it instead taught that only a full new scan should be performed when an update was needed. *See id.* The Examiner then concluded, based on the teachings of the references he considered, that the prior art “explicitly teaches away from the claimed process.” EX1004, 5.

Grounds 1 and 2 completely ignore these conclusions, first arguing that the wording of independent claims 1 and 9 contains no temporal aspect, then arguing that the claimed updating would have been obvious based on the general knowledge of a POSA. *See infra* §§V.A-B (discussing the deficiencies of Grounds

1 and 2). Accordingly, there is substantial overlap between the arguments presented in the petition and herein and the issues considered during examination.

Accordingly, “substantially the same” art and arguments were previously presented to the Office, satisfying the first prong of the §325(d) framework.

B. The Petition Fails to Demonstrate that the Office Materially Erred

Factors (c), (e), and (f) of *Becton, Dickinson* evaluate whether the petition has identified “a material error by the Office.” *Advanced Bionics*, Paper 6 at 10. A material error must be a clear, egregious error: “If reasonable minds can disagree regarding the purported treatment of the art or arguments, it cannot be said that the Office erred in a manner material to patentability.” *Id.*, 9. Factor (c) “focuses on the record developed by the Office in previously reviewing the art or arguments.” *Id.* The other two factors “focus on the petitioner’s evidence of previous Office error.” *Id.* Factor (e) addresses “whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation.” *Id.*, 9 n.10. Factor (f) addresses “the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.” *Id.*

Because the petition implicates substantially the same art and arguments, Petitioners have an obligation to demonstrate material error by the Office. But as explained below, the petition does not even acknowledge the Office’s conclusions regarding claim interpretation and findings regarding the teachings of the prior art,

let alone identify material error by the Office in its determination that the same prior art did not render the current claims obvious. Nor does Petitioner grapple with the Examiner's determination that the closest prior art actually undercut a motivation to arrive at the solution Petitioners now claim was generically obvious to a POSA. It is not Patent Owner's burden to prove no error. Petitioner was well aware of the relevant prosecution history and simply ignored it without justification. *Cf. Stryker Corp. v. KFX Medical, LLC*, IPR2019-00817, Paper 10 at 28-29 (failure to address known evidence of secondary considerations weighs against institution).

Factor (c) – As discussed above for factors (a) and (b), both Rubbert and Babayoff were presented to the Office, the Office had good reason to consider both references, and did consider them. The petition's only argument on this point is that many other references were also disclosed to the Office (*see* Pet., 78-79), but this argument fails as discussed above in §II.A. Thus, the Office previously considered the same art, and Petitioners show no material error in the Office's consideration. Furthermore, as discussed above for factor (d), the Office specifically considered arguments that are material to the presented grounds of unpatentability, both with regard to claim interpretation and the teachings of the prior art. Because the presented grounds contradict the Office's conclusions on these points, there is a material conflict between the record developed by the

Office and the arguments advanced by the petition, which Petitioners fail to address.

Factor (e) – The petition identifies no error in the Office’s previous determinations, nor do they even attempt to do so. Petitioners’ discussion of the prosecution history of the ’936 patent is entirely conclusory and wrong. Petitioners devote two short paragraphs to the subject, covering only the priority claims, a double patenting rejection, and a single quote from the Notice of Allowance. Pet., 9. On this last topic, the petition only says, “A Notice of Allowance was mailed on September 3, 2020 in which the USPTO noted that the allowance of claims 1-20 was at least partly based on the purported closest prior art of record’s failure to provide for or suggest ‘generating a composite scan by using a second scan to update the changed region from the first [scan].’” *Id.* (alteration in original) (quoting EX1004, 5). This brief summary simply ignores the Examiner’s findings regarding the scope of the claims and the teachings of the prior art.

With regard to claim interpretation, Ground 1 takes a position at odds with the Office’s previous perspective without even acknowledging the conflict. *See* Pet., 28 (presuming the claim limitations have no “temporal aspect”). And on the issue of motivation, Ground 2 presents a single-reference obviousness argument that acknowledges that the primary reference, Rubbert, fails to disclose this element. *See* Pet., 42-45 (arguing obviousness based on Rubbert alone). Yet the

petition is silent regarding the Examiner's analysis of the prior art that undermines motivation to modify the prior art as Petitioner has done. *See Polaris Indus. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018) (prior art's discouragement of using a technique or direction towards using a different technique can negate motivation to combine even if it falls short of teaching away). Without even acknowledging the Examiner's findings regarding the teachings of the prior art, Petitioners argue that the element would have been obvious based on a POSA's general knowledge. Petitioners provide no new references teaching this missing aspect, nor do they argue that the Examiner was mistaken in concluding that the prior art led away from this element of the claimed invention. Because the petition ignores the record developed during prosecution, it fails to demonstrate any error by the Office.

Factor (f) – The petition also presents no additional evidence or facts that might warrant reconsideration of the Office's previous determination. The petition identifies no aspect of Rubbert or any other reference tending to undermine the Examiner's conclusions, nor does the petition present any evidence contradicting the Examiner's understanding of the requirements of the claim. The petition thus fails to justify disregarding the Office's prior conclusions regarding claim interpretation or the Office's determination that the prior art actually would have led away from the modification Petitioners now assert to have been obvious.

The petition thus presents the same art previously considered by the Office without even attempting to show that the Office materially erred. Accordingly, the Board should exercise its discretion under §325(d) to deny institution.

III. CLAIM CONSTRUCTION

In an *inter partes* review, a claim is given its ordinary and customary meaning in light of the specification. 37 C.F.R. §42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Here, Petitioners argue they do not “believe any express claim constructions are necessary because the arguments below are not dependent” on proposed constructions being considered by the district court in the WDTX Action. Pet., 12.

After asserting that that they do “not believe any express claim constructions are necessary,” Petitioners proceed to assume constructions for several particular limitations. One of those limitations is particularly relevant to the petition: receiving “second scan data of the patient’s teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient’s intraoral cavity,” as recited in Elements [1.7] and [9.4]. However, Petitioners address only an aspect of this element that is unimportant to the current petition, regarding whether the “physically changed portion” requires that “a dentist or orthodontist makes a physical change to the tooth between scans,” as they argued in district court. Pet., 12. Petitioners assert that the “limitation is

satisfied regardless of whose construction is adopted” because their arguments are addressed to the narrower side of the district court dispute.¹ *Id.*

However, Petitioners’ claim construction section fails to discuss the aspect of this element that is material to the proposed grounds: namely, the time-ordering required by the claim language. At a high level, independent claims 1 and 9 include steps of (1) obtaining first scan data; (2) displaying a model based on the first scan data; (3) removing part of the model based on user input; (4) receiving second scan data including surface data of a physically changed portion of the patient’s intraoral cavity; and (5) replacing the removed part using the second scan data.

In Ground 1, Petitioners take the position that there is no “temporal aspect” required by the claims. Pet., 28. In other words, Petitioners assert that even though the second scan data is described as “including surface data of a physically changed portion of the patient’s intraoral cavity,” it can nonetheless be pre-treatment scan data of a physically-unchanged intraoral cavity, showing teeth as

¹ Ground 2 later mischaracterizes arguments made in district court regarding this aspect of the claims, treating arguments about *who* could make a physical change as though they were addressing what kinds of modifications constituted physical changes to the intraoral cavity. *See infra* §V.B.1.

they originally looked prior to any physical change. *See id.*

This interpretation contradicts the intrinsic record. The plain language of the claims, the description in the specification, and the prosecution history all indicate that the “second scan data including surface data of a physically changed portion of the patient’s intraoral cavity” is data from after, not before, the recited physical change. The starting point for claim construction is the plain language of the claims. *Phillips*, 415 F.3d at 1312. Here, the plain language expressly states that the second scan data must include “surface data of a physically changed portion of the patient’s intraoral cavity.” This language contradicts an interpretation in which the second scan data is an earlier, original scan of unchanged teeth, whereas the first scan data is a later scan with a changed surface (brackets that Petitioner relies on being removed in digital editing).

In addition to the claims’ plain language, the specification is “always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Id.*, 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Numerous examples in the specification support the interpretation that the second scan data is from a post-change scan. For example, the specification describes identifying and deleting a first portion of a “virtual model” (i.e., the model based on the first scan data), then obtaining “additional 3D data” (i.e., second scan data) to fill in the

deleted part. EX1001, 4:3-14. The specification discloses that the “additional 3D data” can be “representative of a second physical portion,” and that the “second portion” can “correspond[] to said first portion of said first physical part wherein said at least a part of said surface of interest has been physically altered.” EX1001, 4:44-50, 5:60-6:13. Describing the second portion (the replacement data) as ***having been physically altered*** makes it clear that the replacement data is post-change data. Other parts of the written description mirror this disclosure, repeatedly describing forming “an updated virtual model” by scanning teeth and using the subsequent scan to replace part of an original model. EX1001, 16:55-65, 29:49-55; *see also id.*, 26:47-27:39 (describing obtaining first model, physically modifying a dental preparation depicted in the model, and “[t]hereafter” obtaining “a second virtual model VM2 corresponding to the modified preparation”). Accordingly, the specification (like the claims) indicates that the “second scan data including surface data of a physically changed portion of the patient’s intraoral cavity” is obtained from a scan ***after*** physical modifications have been made, confirming that the second scan data is from a post-change scan and the first scan data is from an earlier scan.

The prosecution history also forms a critical part of the intrinsic record, showing how the Office and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. As explained above in §II.A, the Examiner reached this same conclusion

during prosecution, indicating a mutual understanding of the claims to require that the first scan be an earlier scan and the second scan be a post-change scan. *See* EX1004, 5. Accordingly, the plain claim language, the specification, and the prosecution history all indicate the claimed second scan data includes post-change scan data—not a pre-treatment scan where there has been no physical change at all.

Intrinsic evidence figures largest in claim construction, but extrinsic evidence may in some cases be relevant, though it is in general less reliable. *Phillips*, 415 F.3d at 1317-19. In this case, however, Petitioners have introduced no extrinsic evidence to construe this claim limitation. *See* Pet., 12 (asserting that no “express claim constructions are necessary”). Accordingly, there is no extrinsic evidence contradicting the conclusion that the recited “second scan data” refers to post-change scan data—not a pre-treatment scan, sans any physical change at all.

Thus, as illustrated in further detail below, Ground 1 is based on an unsubstantiated and unreasonable assumed interpretation of the challenged claims contradicted by the claim language itself and the intrinsic record.

IV. CITED ART - RUBBERT

The Rubbert publication (WO 03/094102) is relied on in the petition for each element of the independent claims of the '936 patent. Pet., 6. The portion of Rubbert the petition relies on involves “monitoring scans” of teeth while they are undergoing orthodontic treatment with brackets bonded to teeth and connected by

an archwire. Pet., 13; EX1005, 1:18-2-21. Rubbert describes that in the middle of a course of treatment, an orthodontist may wish to visualize a bracketed tooth without the bracket. EX1005, 29:28-31.

To achieve this objective, Rubbert describes obtaining a scan of a bracketed tooth that is in the process of undergoing orthodontic treatment. EX1005, 20:26-21:21, Fig. 6. Rubbert then alters the image by deleting the registered bracket from the model, leaving a data void. *Id.* Rubbert fills this void with tooth surface data from an initial (pre-treatment) scan of the tooth, when the tooth was not yet bracketed and had not yet undergone any physical change. *See* EX1005, 21:10-17 (describing filling or smoothing the void with tooth data from a “virtual tooth model obtained during step 84”); *id.*, 19:21-31, Fig. 6 (characterizing step 84 as creating an “original 3D model” prior to bonding brackets on the tooth); *see also id.*, 29:28-30:29, Fig. 16 (describing this process as filling the void with data retrieved from “a patient data record” that requires “an original scan without any [appliance] placed on the teeth”).

V. THE PROPOSED GROUNDS OF CHALLENGE FAIL

A. Ground 1 Fails

The petition alleges that claims 1, 4-7, 9, and 11-13 were anticipated by WO 03/094102 to Rubbert. Pet., 16. These claims include two independent claims (1 and 9) with the remaining claims depending from one of claims 1 or 9.

Independent claim 1 recites a “system for scanning a patient’s teeth for a dental procedure” that comprises “a computer-readable medium including instructions that when executed by a computer system, cause the computer system to,” among other limitations, “receive first scan data of the patient’s teeth from the hand-held intraoral scanner,” receive user input defining a portion of the model to be removed,” and “receive second scan data of the patient’s teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient’s intraoral cavity.” EX1001, 30:24-50. Petitioners identify this last limitation as Element [1.7] of claim 1. Pet., xi. Independent claim 9 recites a method reciting a similar limitation, identified by Petitioners as Element [9.4]. As discussed below, Petitioners have not met their burden of showing that Rubbert discloses either of these elements.

1. The Petition Fails to Show Rubbert Discloses Elements [1.7] or [9.4]

Claim 1 describes instructions that cause a computer system to perform a series of steps, in which “first scan data” is received to generate a model of a patient’s teeth, a user “defin[es] a portion of the model to be removed,” and “second scan data” is received and used to replace portions of the model removed according to the user input. Element [1.7] of claim 1 specifically requires that the second scan data received from the intraoral scanner “includ[e] surface data of a physically changed portion of the patient’s intraoral cavity.” Petitioners fail to

show that Rubbert discloses this element.

Claim 1 requires taking a model based on an original image (the “first scan data”) and then updating that model using “second scan data” showing a portion that has physically changed from the first scan data. Element [1.7] reflects this aspect by reciting “the second scan data including surface data of a physically changed portion of the patient’s intraoral cavity.” This indicates that the second scan data is post-change scan data. *See supra* §III. Petitioners turn the claim on its head, mapping a scan of teeth that have been modified to the “first scan data” and mapping a scan of teeth as they originally appeared (with no modification) as “second scan data.”

Petitioners map Rubbert to the claims in an out-of-order manner. Under Petitioners’ mapping, the alleged “first scan data” received by Rubbert’s system is a scan of teeth in their current state after the only identified change—the affixing of orthodontic brackets. Meanwhile, the “second scan data” is Rubbert’s scan data of teeth as they originally were prior to any treatment or physical modification, and before the addition of brackets.

Specifically, Petitioners state that Rubbert discloses obtaining a scan of a patient’s teeth that have had orthodontic brackets added, and they map this scan of the patient’s current, bracketed teeth as the claimed first scan data. Pet., 28; *see also id.*, 21-24 (describing obtaining “3D digital data” mapped to the recited “first

scan data” and registering a bracket on a tooth). As Petitioners further argue, Rubbert obtains the scan of bracketed teeth after the ongoing treatment has begun (a post-treatment scan) and deletes the bracket, leaving a model of the current tooth with a void where the bracket was deleted. Pet., 13, 23-26. For the second scan data, Petitioners point to pre-treatment scan data of the patient’s teeth as they originally appeared, before being changed by adding a bracket, which Rubbert uses to fill the void in the edited post-treatment scan so as to depict the tooth as it would appear post-treatment but without the bracket. Pet., 28. In particular, Petitioners assert that step 300 of Rubbert’s Fig. 16, in which the system retrieves “scan data received during another scan of the patient at which time the patient did not have bracket treatment,” constitutes receiving the recited second scan data. Pet., 26-27. Thus, Petitioners identify the second scan data as data from the patient’s teeth as they originally were, with no change, while they identify the first scan data as data of the patient’s teeth as they later are during wire/bracket orthodontic treatment.

However, this mapping fails to align with the challenged claims and the claim language. Element [1.7] requires that the “second scan data include[e] surface data of a **physically changed portion** of the patient’s intraoral cavity.” As the Examiner observed during prosecution, this language makes it clear that the “initial” data corresponds to the first scan, while the second scan data must be data of a “post-change” scan. EX1004, 5; *see supra* §II.A; *see also supra* §III (intrinsic

evidence uniformly supports this construction). After all, for the second scan data to include “surface data of a physically changed portion,” the surface must have physically changed to produce the second data.

The context of the claim makes it clear that the recited “change” must be a change from the intraoral cavity as it appears in the first scan data. Indeed, Petitioners specifically identify the recited change as being “relative to the first scan data.” Pet., 28. For the intraoral cavity of the second scan data to be physically changed relative to the first scan data, the second scan data must not be data of the original configuration of the patient’s teeth, since that would make them unchanged (and would make the first scan data the data that includes a change to the patient’s intraoral cavity).

Yet Petitioners expressly map the second scan data to data from an “original scan” of the patient’s teeth, prior to the addition of a bracket, which is reflected in the alleged “first scan data.” Pet., 28. This mapping ignores the claim language requiring that the *second* scan data include the “physically changed portion,” since Rubbert’s pre-treatment scan shows teeth that have undergone no physical change at all. Because the data Petitioners identify as the second scan data lacks a physically changed portion, they fail to demonstrate that Rubbert discloses this element.

Petitioners argue that there is no “temporal aspect” required by the claim

language, but their arguments fail. First, Petitioners cite the specification as stating that “the physical changes can be the adding or removing of physical entities.” Pet., 28 (citing EX1001, 29:64-30:9). However, the section of the specification Petitioners cite fails to support their claim interpretation. The actual language used by the specification describes “scanning the modified physical structure in the area that includes the new geometrical entity or that includes the modification of the physical structure arising from the removal of the geometrical entity, respectively, and modifying the original 3D virtual model to replace a corresponding part thereof with the 3D data corresponding to the aforesaid scanned area.” EX1001, 29:64-30:9. In other words, the replacement data (i.e., “the second scan data including surface data of a physically changed portion of the patient’s intraoral cavity”) is a scan showing either a new entity added after the first scan or the structure as modified after removal of an entity that was present during the first scan. In both cases, however, the second (replacement) scan is of teeth at a later time, after a physical change. The specification’s statement that “changes” may encompass “adding or removing” physical entities does not mean that an image showing an *unchanged* structure counts as an image showing a “physically changed portion,” as required by the claims. Rather, in the example Petitioners rely on, the “surface data of a physically changed portion of the patient’s intraoral cavity” is the *later* scan data of a structure that was *physically changed* by adding

or removing an entity. This example thus goes against Petitioners' contention that there is no "temporal aspect" to the claims.

Second, Petitioners argue that "no particular order is required based on the claim wording choice," but the portion of the specification they cite to is irrelevant to their assertion. Pet., 28 (citing EX1001, EX1001, 30:10-21). The cited part of the specification reads as follows:

In the method claims that follow, alphanumeric characters and Roman numerals used to designate claim steps are provided for convenience only and do not imply any particular order of performing the steps.

Finally, it should be noted that the word "comprising" as used throughout the appended claims is to be interpreted to mean "including but not limited to".

While there has been shown and disclosed some embodiments in accordance with the invention, it will be appreciated that many changes may be made therein without departing from the spirit of the invention.

EX1001, 30:10-21. The latter two paragraphs do not discuss timing of steps at all.

As to the first paragraph, it only states that "alphanumeric characters and Roman numerals used to designate claim steps...do not imply any particular order of performing the steps." EX1001, 30:10-13. Yet none of the claims of the '936 patent designates any steps using either alphanumeric characters or Roman numerals. On the contrary, the "temporal aspect" of claim 1 arises from the wording of the claim language and the context provided by that language when

read in light of the specification.

Moreover, even if the steps of claim 1 could be performed in a different order, this would not imply that the claims lack a “temporal aspect” for elements recited within those steps. For example, steps [1.3] and [1.7] recite steps of a computer system receiving the first and second scan data, respectively. Even if the claims did permit performing those steps in the opposite order, that would merely mean that the data were received by a computer in the opposite order. This would not erase the requirement that the second scan data must be of a physically changed (and thus later-in-time) portion of the intraoral structure. For example, the scans might be taken in the order required by the claim language (first being pre-change and second being post-change), but then received by the computer in the opposite order. Thus, the claims retain a “temporal aspect” regardless of whether the recited steps might be performed in a different order.

Since Petitioners concede that their application of Rubbert to Element [1.7] requires that the claim have no such “temporal aspect” (Pet., 28), Petitioners therefore fail to show that Rubbert discloses each and every element of claim 1.

Petitioners fail to meet their burden for the remaining claims as well. With regard to independent claim 9, Petitioners characterize Element [9.4] as having limitations “identical to the limitations recited in Element [1.7], except that claim 9 is a method claim.” Pet., 39. Petitioners present no new arguments related to this

element, relying only on a reference to their discussion of Element [1.7]. *See id.* Accordingly, Petitioners fail to demonstrate that Rubbert anticipates claim 9 for reasons similar to those discussed above for claim 1. Finally, claims 4-7 and 11-13 depend directly or indirectly from independent claims 1 and 9 respectively. Thus, Petitioners fail to show that Rubbert anticipates any of these claims.

For the foregoing reasons, Petitioners fail to meet their burden of demonstrating that claims 1, 4-7, 9, and 11-13 were anticipated by Rubbert.

B. Ground 2 Fails

Ground 2 argues that claims 1, 4-13, 17, and 20 were obvious over Rubbert. This ground fails to remedy the deficiencies with regard to the “second scan data” elements of independent claims 1 and 9 discussed above in §V.A.1, and likewise fails to show that Rubbert renders obvious the corresponding elements of independent claim 17.

1. The Petition Fails to Show Rubbert Teaches or Suggests Elements [1.7] or [9.4]

In Ground 2, Petitioners presume that claim 1 requires that either “(i) the ‘second’ scan data of claim 1 must be received later in time than the ‘first’ scan data; or (ii) the patient’s intraoral cavity must be physically changed after receiving the ‘first’ scan data.” Pet., 42. Petitioners concede that Rubbert does not teach this element, asserting instead that it would have been obvious in view of Rubbert alone. *Id.* In particular, Petitioners propose using a new scan instead of Rubbert’s

pre-treatment patient scans. Pet., 42-45. But as discussed below, this proposal makes no sense. Not only would this new scan be unnecessary, it would fail to provide the information Rubbert requires. Petitioners thus propose an irrational combination that fails to meet their burden.

Claim 1 recites receiving “second scan data of the patient’s teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient’s intraoral cavity,” and using that second scan data to replace removed data from a first scan, where the first scan data reflects an initial state of the patient’s teeth and the second scan data is of the intraoral cavity after a physical change from the teeth of the first scan data. The result is to produce a model in which the portion that the second scan data replaces is updated to reflect the physical structure of the intraoral cavity as it currently appears, after a physical change to the replaced portion as depicted in the original first scan data. *See, e.g.*, EX1001, 29:45-55 (describing the resulting “updated 3D virtual model of the physical structure” that results from rescanning a physically changed part of a previously-imaged structure); *see also id.*, 30:48-50 (Element [1.9], reciting outputting of the updated model).

As Petitioners concede, Rubbert does not disclose updating an original scan with data from a post-change scan. Instead, Rubbert discloses the opposite: obtaining a scan of a tooth including a bracket, identifying and removing the

bracket, then using old images from a pre-treatment patient scan showing a physically unchanged tooth to fill in the removed portion that was covered by the bracket. *See* EX1005, Fig. 16, 30:8-29. Whereas the process recited in the claims of the '936 patent requires updating a model based on first, unchanged data with second data showing a physically-changed portion, thus reflecting the final, changed appearance of the intraoral structure, Rubbert does the reverse. Rubbert's technique creates a modified post-treatment image (monitoring scan) that deletes the added brackets, then fills the resulting void on the tooth surface with original (unchanged) surface data.

Rubbert's approach is at odds with the '936 patent's claims. The objective of Rubbert's technique is to represent teeth in current post-treatment state without the present brackets obscuring the view—it accomplishes this by restoring a current surface portion (a tooth covered by a bracket) with an unchanged appearance (a tooth before application of a bracket). *See* EX1005, 29:28-30:3 (addressing “need to obtain a new or a revised virtual model of the tooth underlying the registered bracket in the model”), 30:24-29 (replacing data void from bracket deleted from current tooth model with portion of old tooth model). This process is the opposite of what is recited in the '936 patent's claims, which are directed to producing a model by taking an original scan and updating a physically changed portion with new scan data reflecting the current, post-change

state.

Notwithstanding this fundamental difference in the purpose and function of Rubbert and the invention recited in the claims of the '936 patent, Petitioners assert that obtaining a second scan by “re-scanning that area would have been an obvious variation of Rubbert.” Pet., 42. However, Petitioners fail to articulate a logical rationale or produce corroborating evidence supporting this assertion.

Instead, Petitioners propose a counterproductive, self-defeating modification to Rubbert’s system. Petitioners assert that “after cleaning or performing a simple, conventional dental operation to adjust the position of the bracket on the tooth...it would have been obvious to re-scan the patient’s teeth and use that scan data to replace Rubbert’s tooth void in the same manner as disclosed in Rubbert of using the tooth data from the patient’s record.” Pet., 43-44. But Petitioner does not explain how such a new scan would accomplish the objective of Rubbert’s system. As discussed above, Rubbert creates a void when it deletes a bracket from a scan image and fills the resulting void with original tooth surface data from a pre-treatment scan where no bracket is obscuring the surface, thereby producing an image of a tooth without a bracket. Thus, Rubbert requires an image of an unbracketed tooth to fill the void created by deleting the bracket.

Rescanning the same bracketed tooth after cleaning it, as petitioner proposes, would not allow a new scan to show the part of the tooth under the

bracket. Nor would rescanning a tooth after adjusting the same bracket show the tooth in an unbracketed state. In either case, Petitioners' proposed second scan would have the same obstruction that Rubbert seeks to remove: a bracket covering the tooth's surface. Petitioners' modified process would therefore fail to produce the data Rubbert needs for its model: data for the underlying surface of the tooth that is obscured by a bracket. Moreover, Rubbert already possesses a suitable data source for its purpose: models from the patient's pre-treatment records. It makes no sense to replace the already existing source containing the data Rubbert needs with a new scan having the same bracket obscuring the same tooth surface. The new scan would appear to be inferior to the pre-treatment records, if not entirely worthless, as a new scan does not provide the data Rubbert needs. Petitioners' proposed modification would appear pointless and incompatible with Rubbert's objective. *Cf. In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (modification must not render device "inoperable for its intended purpose").

Petitioners also engage in hindsight reasoning to argue that the '936 patent's own disclosures teach two reasons to arrive at the claimed invention. Specifically, they cite the '936 patent to argue that (1) "soft tissues such as the gums or other agents such as saliva were known to obscure intraoral structures such as the finish line during intraoral scanning" (Pet., 42-43 (citing (EX1001, 1:62-67))); and (2) "a dental practitioner would have used their dental training to remove obscuring

agents (such as gums or saliva) such that the finish line is no longer obscured” (Pet., 43 (citing EX1001, 14:12-38)). Not only is this reliance on the ’936 patent’s disclosure textbook hindsight-based reasoning, Petitioners do not even accurately characterize the parts of the patent they cite to. For example, Petitioners cite to column 14, lines 12-38 as purportedly describing that a practitioner “would have used their dental training to remove obscuring agents,” but the cited portion says nothing about this, discussing instead user and automated analysis “to determine the suitability of the first physical part for the purpose of allowing a prosthesis to be seated thereon.” EX1001, 14:12-38. Regardless, Petitioners’ naked reliance on hindsight reasoning cannot support an obviousness ground.

To buttress their motivation arguments, Petitioners cite to Align’s arguments during concurrent district court proceedings, asserting that Align argued “that removing saliva or even a piece of spinach from a patient’s teeth creates ‘a physically changed portion of the patient’s intraoral cavity.’” Pet., 43 (citing EX1022, 29-31). To begin with, Petitioners mischaracterize the context of the district court argument. The subject of the district court proceedings was not about what types of modifications constituted physical changes to a portion of the patient’s intraoral cavity. Rather, the claim construction arguments related to *who* could bring about the recited physical changes. *See* EX1022, 29 (“The only dispute is whether the ‘dental practitioner’ has to be the one actually removing

whatever is obstructing part of the mouth in the first image.”). In response to 3Shape’s contention that the claims required a dental practitioner to have made the physical change, Align pointed out that the claims do not recite this, and that the specification disclosed various types of modifications (some of which involve physical changes, such as performing a “removal operation” on a tooth), and that some modifications might be made by someone other than a dental practitioner, such as a patient. *Id.*, 29-31.

Petitioners use this present-day argument to manufacture a motivation to modify Rubbert, but this motivation is both infected by hindsight bias and counterproductive in the context of Rubbert. Petitioners argue that a POSA would have appreciated that incorporating the ideas Align discussed into Rubbert would have furthered Rubbert’s “aim to ‘acquire accurate and complete scan results of dental devices having small or minute geometrical structures.’” Pet., 43 (quoting EX1005, 3:16-17). They also suggest it would serve the “general need” disclosed by Rubbert to “generate an accurate virtual model of the teeth and the appliance and thereby locate manually bonded brackets.” *Id.* (quoting EX1005, 5:11-13). However, these generic objectives from Rubbert do not supply any direction toward the particular modifications Petitioners propose, leaving them relying on Align’s own disclosure to motivate their modifications.

At best, Petitioners’ reliance on the disclosure of the ’936 patent and Align’s

own present-day arguments introduces impermissible hindsight bias. Regardless, as discussed above, the modifications to Rubbert that Petitioners actually propose are nonsensical, discarding essential data in favor of data that would be useless for Rubbert's purposes.

Petitioners also argue a lack of unexpected results, but this does not address the deficiencies of Petitioners' self-defeating modification and lack of rationale for making the modification in the first place. Indeed, beyond there being no motivation, Petitioners' proposal raises a separate issue of reasonable expectation of success. The proposed modification does not provide the data Rubbert needs to fill the void created by deleting the bracket from Rubbert's scan of the bracketed tooth. Rubbert requires a scan of an unbracketed tooth to fill this void (EX1005, 30:24-29), yet Petitioners would substitute another scan of the same bracketed tooth.

Petitioners' attempt to argue reasonable expectation of success misses this point. They argue that a second data scan taken later would have the "same underlying data structure" as a scan taken earlier, so a POSA would have had a "reasonable expectation of success in making this modification." Pet., 44. Yet this only speaks to the gross capacity to combine data. Rubbert's objective is not to combine data in general, it is to provide a model of a tooth in which a bracket is deleted and replaced with what the underlying tooth would have looked like.

Petitioners fail to show a reasonable likelihood of success in achieving this objective; indeed, their modification would preclude success because they propose throwing away the only data useful for Rubbert's objective (i.e., the pre-treatment model from Rubbert's patient record).

Petitioners also argue that Rubbert's alleged "second scan data" is "used for the same purpose and to achieve the same result as the second scan data recited in Element [1.7]." Pet., 44. However, as repeatedly discussed above, this is not true. Rubbert seeks to modify a bracketed image of a current tooth by deleting a bracket and filling a data void with surface data from an unmodified structure, thereby producing a model of how the tooth might look without the bracket that is currently affixed to it. The '936 patent's claims are directed to the entirely different concept of updating an earlier scan with new scan data reflecting a physical change occurring during treatment, thereby producing an updated model of the intraoral structure as it actually appears.

Petitioners finally rely on *In re Burhans*, 154 F.2d 690 (C.C.P.A. 1946), but this reliance is misguided. *Burhans* relates to processes for combining ingredients, addressing the obviousness of varying that the order of combining a known set of ingredients in a composition of matter. *See id.*, 691-92 (addressing claims to forming a composition of germless flour impregnated with carbon dioxide). Essential in that case was that each step was the same, regardless of order. *See id.*

Petitioners implicitly assume that the second scan data in Rubbert is used for the same purpose and to achieve the same result as the second scan data of Element [1.7], but this assumption is false. In the claims, a part of an earlier scan is replaced with new scan data to produce an updated model of the patient's teeth as they currently appear, whereas in Rubbert a part of a current scan is replaced with old data to produce a model *not* corresponding to how the patient's teeth currently appear. Petitioners' modification is thus more than a mere reordering of steps, rendering *Burhans* inapplicable.²

Finally, Petitioners fail provide sufficient motivation to overcome the Examiner's findings during prosecution. As discussed above in §II, the Examiner found during prosecution that the prior art "explicitly teaches away from the claimed process, [in] which data is newly captured and composited to update for the intra-oral modification." EX1004, 5. Specifically, the Examiner found that the prior art taught that when updating was needed, one should "generat[e] an entirely new scan rather than generating a composite scan by using a second scan to update

² Indeed, as discussed above in §V.A.1, the "temporal aspect" of the claims is independent of the ordering of the steps, as it arises from the requirement that the second scan data include "surface data of a physically changed portion of the patient's intraoral cavity."

the changed region from the first”. *Id.* At a minimum, this undermines a motivation to modify Rubbert to arrive at the claimed invention. *See, e.g., Polaris*, 882 F.3d at 1069 (prior art’s discouragement of using a technique or direction towards using a different technique can negate motivation to combine even if it falls short of teaching away). Petitioners do not even acknowledge the Examiner’s finding that the prior art taught away from the rescanning and updating process recited in the claims of the ’936 patent, much less provide any evidence or argument to rebut it. *See Pet.*, 9 (quoting part of the Notice of Allowance but omitting the Examiner’s conclusions regarding teaching away). Indeed, even if Rubbert were modified to produce a model of the patient’s current teeth, Petitioners provide no reason why a POSA would not simply use a whole new scan, with no deletion and replacement of a portion of the scan (just as the art considered during examination suggests). In view of the Examiner’s unrebutted findings, Petitioners’ reliance on general arguments of obviousness fails to meet their burden to show a motivation to combine.

Accordingly, Petitioners have failed to show that claim 1 would have been obvious over Rubbert.

Similar to Ground 1’s treatment of claim 9, Ground 2 applies the same reasoning to Element [9.4] as to Element [1.7]. *See Pet.*, 47 (providing no new reasoning relating to this aspect of claim 9). Thus, Petitioners fail to show that

claim 9 would have been obvious over Rubbert for reasons similar to those discussed above for claim 1. Likewise, claims 4-10 and 11-13 each depend from independent claims 1 and 9. Because Petitioners' discussion of these claims does not remedy the deficiencies of Rubbert with respect to the independent claims, Petitioners also fail to show that any of these claims would have been obvious over Rubbert.

2. The Petition Fails to Show Rubbert Teaches or Suggests Element [17.7]

Claim 17 includes limitations similar to claims 1 and 9. Specifically, Petitioners identifies the following limitation as Element [17.7]:

after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;

Pet., xv. This limitation is similar to Elements [1.7] and [9.4], in that it requires that the second scan data (which the remaining limitations indicate is the scan data used to replace removed data from the first scan data's model) to be obtained after removing the "portion of the model" generated based on the first scan data. Thus, like claims 1 and 9, claim 17 requires obtaining new scan data to update an identified portion of an earlier scan.

Petitioners argue that "[e]xcept for the phrase 'after removing the portion of the model,' this limitation is identical to corresponding limitations in Element [1.7]," and they argue that it is obvious for the same reasons as Element [1.7].

Pet., 50. As discussed in §V.B.1, Petitioners' arguments for the obviousness of Element [1.7] fail. Accordingly, Petitioners similarly fail to show claim 17 to have been obvious over Rubbert. Similarly, Petitioners fail to demonstrate that claim 20, which depends from claim 17, would have been obvious over Rubbert.

For the foregoing reasons, Petitioners fail to meet their burden of demonstrating that claims 1, 4-13, 17, and 20 were obvious over Rubbert.

C. Ground 3 Fails

In Ground 3, Petitioners allege that claims 2, 3, 18, and 19 would have been obvious over Rubbert in view of Babayoff. Pet., 53. Claims 2 and 3 depend from independent claim 1 and claims 18 and 19 depend from independent claim 17. The petition only alleges that the combination with Babayoff would have rendered obvious the additional elements recited in claims 2, 3, 18, and 19; Petitioners do not propose any modifications relating to the limitations of the independent claims. *See* Pet., 58-62. Accordingly, Ground 3 fails to overcome the shortcomings of Grounds 1 and 2 with respect to independent claims 1 and 17.

For the foregoing reasons, Petitioners fail to meet their burden of demonstrating that claims 2, 3, 18, and 19 would have been obvious over Rubbert in view of Babayoff.

D. Ground 4 Fails

In Ground 4, Petitioners allege that claims 14-16 would have been obvious

over Rubbert in view of Rosenstiel. Pet., 62. Claims 14-16 depend from independent claim 9. The petition only alleged that the combination with Rosenstiel would have rendered obvious the additional elements recited in claims 14-16; Petitioners do not argue that the addition of Rosenstiel would render obvious any limitations of the independent claims. See Pet., 65-74. Accordingly, Ground 4 fails to overcome the shortcomings of Grounds 1 and 2 with respect to independent claim 9.

For the foregoing reasons, Petitioners fail to meet their burden of demonstrating that claims 14-16 would have been obvious over Rubbert in view of Rosenstiel.

VI. CONCLUSION

Accordingly, for at least the reasons set forth above, institution of *inter partes* review should be denied.

Respectfully submitted,

Date: November 9, 2021

/ Michael T. Rosato /

Michael T. Rosato, Lead Counsel
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CERTIFICATE OF COMPLIANCE

Pursuant to § 42.24(d), the undersigned certifies that this paper contains no more than 14,000 words, not including the portions of the paper exempted by § 42.24(b). According to the word-processing system used to prepare this paper, the paper contains 8,915 words.

Respectfully submitted,

Date: November 9, 2021

/ Michael T. Rosato /
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VII. APPENDIX

EXHIBIT NO.	DESCRIPTION
2001	U.S. Patent Publication No. 2002/0006217 to Rubbert et al.
2002	U.S. Patent Publication No. 2003/0021453 to Weise et al.

CERTIFICATE OF SERVICE

I certify that the foregoing Patent Owner's Preliminary Response Pursuant to 37 C.F.R. § 42.107 and accompanying Exhibits 2001-2002 were served on this 9th day of November, 2020, on Petitioners at the following electronic service addresses:

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